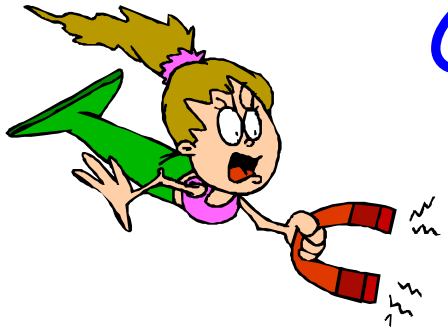
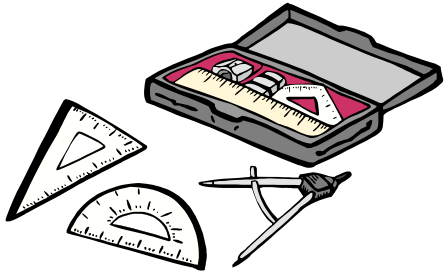
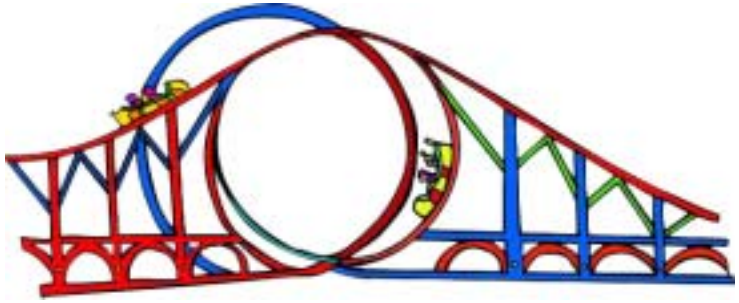


Children's Engineering

A Teacher Resource Guide for Design and Technology in Grades K-5

Commonwealth of Virginia
Department of Education
Richmond, Virginia





Children's Engineering

A Teacher Resource Guide for Design and Technology in Grades K-5

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Foreword

Children's Engineering: A Teacher Resource Guide for Design and Technology in Grades K-5 identifies technology-based experiences that enhance the content of selected Standards of Learning in English, mathematics, science, and history and social science. The experiences enable teachers to introduce children in grades K-5 to the technological world around them. The document is designed to be a companion to the Standards of Learning and a resource for enhancing the locally developed curriculum.

Each experience is intended to reinforce specific Standards of Learning. Additionally, these experiences have been correlated to the *Standards for Technological Literacy: Content for the Study of Technology.* The experiences promote critical thinking and problem-solving abilities, and they build upon a child's capability to retain content described in the Standards of Learning.

The resource guide is arranged by grade level. Each grade level contains four experiences; each experience is focused on a different subject area. The supporting resources in each experience consist of a design brief, a teacher resource page, a guided portfolio, and an assessment rubric.

This document provides teachers with the instructional materials they need to implement each experience. The majority of the supplies and materials that are needed to implement the experiences are readily available in most elementary classrooms. The instructional pages are child-friendly and ready to copy. Target and supporting Standards of Learning are specified on all materials to illustrate the academic strength inherent in K-5 technology education experiences. The document has been carefully written to ensure the experiences are age appropriate. Each experience has been crafted to build increasingly sophisticated concepts, knowledge, and ability as children mature. We hope you will enjoy using this document and that it will be a worthwhile experience for all children in grades K-5.

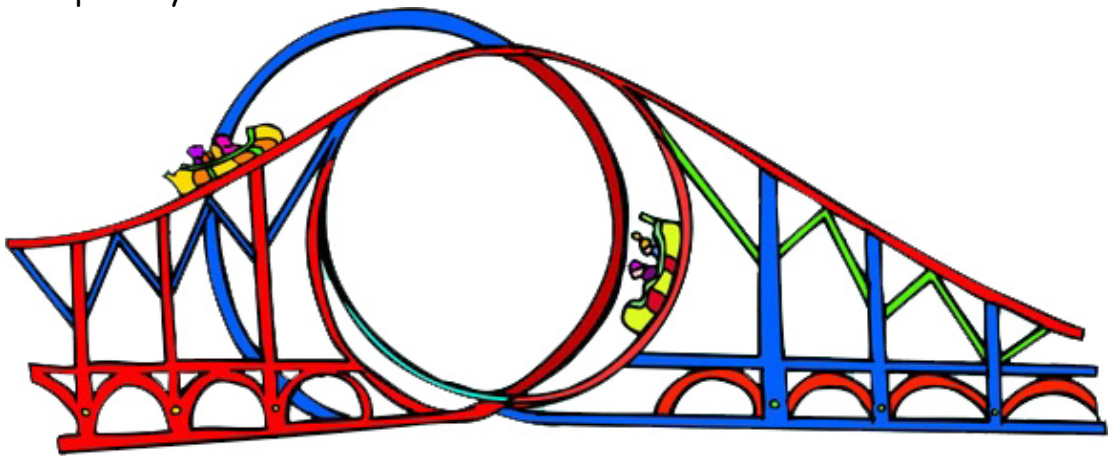
George R. Willcox
Program Specialist
Technology Education Service

Preparing Children for a Technological World

Humans have been called the animals that make things, and at no time in history has that been so apparent as the present. Today, every human activity is dependent upon various tools, machines, and systems, from growing food and providing shelter to communication, healthcare, and entertainment. Some machines, like the tractor, make more efficient activities that humans have done for hundreds or thousands of years. Others, such as the airplane or the Internet, make possible things that humans have never been able to do before. This collection of devices, capabilities, and the knowledge that accompanies them is called technology.

Broadly speaking, technology is how people modify the natural world to suit their own purposes. From the Greek word *techne*, meaning art or artifice or craft, technology literally means the act of making or crafting, but more generally it refers to the diverse collection of processes and knowledge that people use to extend human abilities and to satisfy human needs and wants.

Children's Engineering: A Teacher Resource Guide for Design and Technology in Grades K-5 combines selected core content in the Standards of Learning and technology experiences to assist children in developing their ability to use, create, control, and assess technology. With the growing importance of technology to our society, it is vital that every child receive an education that emphasizes technological capability.



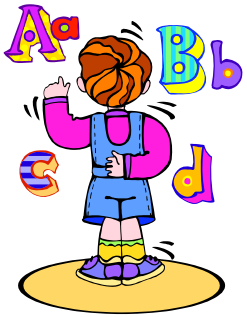
Quick Hints for Getting Started

Listed below are some quick hints that might help classroom teachers implement the activity packages:

- Read the design brief *before* reading the teacher resource page. It will help in your understanding of the activity.
- Materials should be limited to the items on the design brief. Teachers may make substitutions or eliminate items that are unavailable. Students may *not* make any substitutions or use more material than specified.
- Challenges can usually be completed in more than one way. Students are encouraged to use the allowed materials in varied and unusual ways.
- Collaboration among group members is stressed.
- Organize the materials for groups by placing them in bags, in boxes, or on trays. This speeds up transition time between lessons and improves time on task.
- Oral presentations are to be presented by groups after a project has been completed. This can be done as an English lesson even if the activity's target is math, science, or history. Rubrics for oral communication skills are included for grades 2 through 5.
- Reading comprehension is an important aspect of each activity in the upper grades. Encourage each group of students to read through the design brief, guided portfolio, and the project rubric if they have trouble understanding the challenge. Teamwork is encouraged.
- Challenges contain supporting Standards of Learning from various areas of the curriculum. This provides the opportunity for the classroom teacher to integrate the project sessions into several curriculum areas. Lesson planning strategy should be guided by the target and supporting Standards of Learning of each activity.

Design Brief Titles

Kindergarten

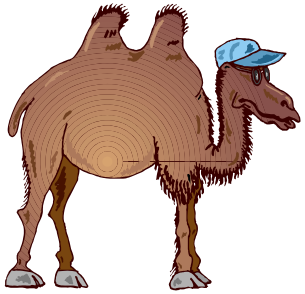


- Building a Letter
- Shapes All Around Us
- Magnet Motion
- Old-Fashioned Paper Dolls

First Grade

- Exploring Homophones
- Math Fact Family Map
- Solar Cooking
- Past and Present

Second Grade



- Dog Biscuit Delivery
- Ancient Construction
- High Flying Balloons
- A Chair for Mom

Third Grade

- Famous Historical Figures
- Geometric Creatures
- Exploring Animal Environments
- Shipping Across the Centuries

Fourth Grade

- The Virginia Company of London Wants You!
- Pack Your Trunk
- Light Your Way
- Understanding Life in Jamestown

Fifth Grade

- Build a Bridge
- Playground Construction
- Music Makers
- Model of a Colony

Acknowledgements